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REMARKS/ARGUMENTS:

Claims 17-21 are canceled without prejudice. Claims 3, 11, and 12 are amended. Support for the amendment to claim 3 can be found at p. 21, lines 15-18 of Applicant's specification. Support for the amendment to claim 11 can be found at p. 29, lines 14-20 of Applicant's specification. Support for the amendment to claim 12 can be found at p. 14, line 17-p. 15, line 2 of Applicant's specification. New claims 23 and 24 are added. Support for new claim 23 can be found at p. 29, lines 10-20 of the Applicant's specification. Support for new claim 24 can be found at p. 17, lines 17-25 of Applicant's specification. Claims 2, 3, 7, 8, 11-16, and 22-24 are pending in the application. Reexamination and reconsideration of the application, as amended, are respectfully requested.

The present invention relates to an optical isolator element used to eliminate a return light created upon introducing a light emitted from a light source to various optical elements and optical fibers, a method for producing such an element, and an optical isolator using such an element. (Applicant's specification, at p.1, lines 5-9).

CLAIM REJECTIONS UNDER 35 U.S.C § 102/§ 103:

Claims 2, 3, 7, and 8 stand rejected under 35 U.S.C. § 102(e) as anticipated by or, in the alternative, under 35 U.S.C. § 103(a) as obvious over Sabia (U.S. Patent Application No. 2003/0206347). The Applicant respectfully traverses this rejection as to amended claim 3. Claim 3, as amended, is as follows:

> An optical isolator element, comprising:
> at least one flat Faraday rotator, and
> at least two flat polarizers,

wherein the Faraday rotator and the polarizers are bonded to each other by van der Waals forces acting between bonding surfaces thereof,

with the bonding surfaces being brought into contact with each other while the bonding surfaces are activated such that atom bonds are present thereon,

wherein the bonding surfaces of at least either one of the Faraday rotator and the polarizers are integrally provided with films made of a soft material which is softer than a dielectric hard material, wherein the soft material is selected from the group consisting of Au, Al, Ag, Cu, Sn, and Ga.

Applicant respectfully submits that Sabia cannot anticipate or render obvious claim 3 because Sabia fails to teach or suggest that "the bonding surfaces of at least either one of the Faraday rotator and the polarizers are integrally provided with films made of a soft material which is softer than a dielectric hard material, wherein the soft material is selected from the group consisting of Au, Al, Ag, Cu, Sn, and Ga."

The Office at p. 7, lines 11-14 of the Office Action states that "a soft material which is softer than a hard dielectric material" means any material that is "softer" than any dielectric material meets the claimed limitation. In response, Applicant amended claim 3 to clarify that the soft material is selected from the group consisting of Au, Al, Ag, Cu, Sn, and Ga.

It is an aspect of the present invention that by depositing the soft material 38 on the bonding surface, the outer surface becomes softer than a dielectric hard material such as SiO_2 and TiO_2. Thus, the Faraday rotator base and the polarizer bases can be more easily bonded since the soft materials 38 are deformed upon

applying pressures to the Faraday rotator base and the polarizer bases. For example, Au, Al, Ag, Cu, Sn, Zn, Ga and the like can be used as the soft material 38 in the case of a metal, whereas alloys mainly containing Si or these metals can be used in the case of a semimetal. (Applicant's specification, at p. 21, lines 10-18).

In this way, the optical isolator element 30 can be produced by the same method as the one shown in FIGS. 2, 3 and 4 even if the soft materials 38 are provided on the bonding surfaces of the Faraday rotator 2 and the polarizers 3, 4. However, bonding conditions such as a degree of flatness, a degree of vacuum and a force of pressure become less strict as compared to the first embodiment having SiO_2 or TiO_2 in the bonding surfaces, thereby presenting an advantage of easiness to bond at normal temperature. The soft material 38 may be provided either on the bonding surfaces of the Faraday rotator 2 or on those of the polarizers 3, 4. (Applicant's specification, at p. 21, line 19-p. 22, line 4).

In light of the foregoing, Applicant respectfully submits that Sabia could not have anticipated or rendered obvious claim 3 because Sabia fails to teach or suggest each and every claim limitation. Claims 7 and 8 depend from claim 3, and as such include all the limitations of claim 3; and therefore, cannot be made anticipated or rendered obvious for at least the same reasons as claim 3. Withdrawal of this rejection is thus respectfully requested.

Claims 11 and 13-16 stand rejected under 35 U.S.C. § 103(a) as obvious over Sabia (U.S. Patent Application No. 2003/0206347). The Applicant respectfully traverses this rejection as to amended claim 11. Claim 11, as amended, is as follows:

> A method for producing an optical isolator element including at least one flat Faraday rotator and at least two flat polarizers bonded to each other via their bonding surfaces, comprising the steps of:

adjusting the relative angular positions of the at least one flat Faraday rotator and at least two flat polarizers so as to maximize an optical isolation effect,

activating the bonding surfaces of the Faraday rotator and the polarizers such that atom bonds are present thereon, and

bringing the Faraday rotator and the polarizers having the activated bonding surfaces into contact with each other in vacuum at room temperature, thereby bonding the Faraday rotator and the polarizers by van der Waals forces created on the bonding surfaces of the Faraday rotator and the polarizers.

Applicant respectfully submits that Sabia cannot render claim 11 obvious because Sabia fails to teach or suggest "adjusting the relative angular positions of the at least one flat Faraday rotator and at least two flat polarizers so as to maximize an optical isolation effect."

It is an aspect of the present invention that the transmitting and polarizing directions corresponding to the outer shape of the two polarizer bases and the polarization rotation angle and the other polarization characteristics of the Faraday rotator base be measured beforehand, and a relative angle of the polarizer bases to provide a good isolation characteristic be calculated beforehand. (Applicant's specification, at p. 29, lines 14-20).

In light of the foregoing, Applicant respectfully submits that Sabia could not have anticipated or rendered obvious claim 11 because Sabia fails to teach or suggest each and every claim limitation. Claims 13-16 depend from claim 11, and as such include all the limitations of claim 3; and therefore, cannot be made anticipated or rendered obvious for at least the same reasons as claim 11. Withdrawal of this rejection is thus respectfully requested.

Claims 12 and 17-22 stand rejected under 35 U.S.C. § 103(a) as obvious over Sabia (U.S. Patent Application No. 2003/0206347) in view of Kub et al. (U.S. Patent No. 6,153,495). This rejection is moot with respect to claims 17-21 due to the cancellation of these claims. The Applicant respectfully traverses this rejection as to claims 12 and 22. Claim 12, as amended, is as follows:

> A method for producing an optical isolator element comprising at least one flat Faraday rotator and at least two flat polarizers bonded to each other via their bonding surfaces, comprising the steps of:
>
> activating the bonding surfaces of the Faraday rotator and the polarizers such that atomic bonds are present thereon, and
>
> bringing the Faraday rotator and the polarizers having the activated bonding surfaces into contact with each other in a vacuum at room temperature, thereby bonding the Faraday rotator and the polarizers by van der Waals forces created on the bonding surfaces of the Faraday rotator and the polarizers, wherein a step of smoothing the bonding surfaces of the Faraday rotator and the polarizers by chemical mechanical polishing is performed before the step of activating the bonding surfaces of the Faraday rotator and the polarizers, wherein the chemical mechanical polishing step comprises sub-steps of polishing the bonding surface using a polishing pad in ultrapure water, and further polishing the bonding surfaces in a colloidal silica, cleaning the bonding surfaces by ultrapure water in an ultrasonic bath after cleaning the bonding surfaces by an alcohol in an ultrasonic bath, and drying the bonding surfaces.

Applicant respectfully submits that cited references cannot render claim 12 obvious because the cited references fail to teach or suggest a chemical mechanical

polishing step comprising the "sub-steps of polishing the bonding surface using a polishing pad in ultrapure water, and further polishing the bonding surfaces in a colloidal silica, cleaning the bonding surfaces by ultrapure water in an ultrasonic bath after cleaning the bonding surfaces by an alcohol in an ultrasonic bath, and drying the bonding surfaces."

Sabia fails to teach or suggest a chemical mechanical polishing step of any kind and is not relied upon by the Office for such. Instead, the Offices states that such a process is a well-known technique used to smooth direct bonding surfaces. The Office cites Kub for teaching that such a technique is useful for preparing direct bonding surfaces. (Kub, column 6, lines 3-9). However, Kub merely mentions a chemical mechanical polishing and does not give any of the limitations that are taught in amended claim 12.

It is an aspect of the present invention that the chemical mechanical process achieves both the desired values of flatness and surface coarseness and allows for face bonding. (Applicant's specification, at p. 15, lines 3-6).

In light of the foregoing, Applicant respectfully submits that Sabia and Kub could not have rendered amended claim 12 obvious, because the combination of references fails to teach or suggest each and every claim limitation. Withdrawal of this rejection is thus respectfully requested.

Claim 22 depends from claim 11 and is therefore, patentable over Sabia for the reasons discussed above. Kub cannot remedy the defect of Sabia and is not relied upon by the Office for such. Instead, the Office cites Kub for teaching that the technique of smoothing by chemical mechanical polishing is useful for preparing direct bonding surfaces.

In light of the foregoing, Applicant respectfully submits that Sabia and Kub could not have rendered amended claims 22 obvious, because the combination of

references fails to teach or suggest each and every claim limitation. Withdrawal of this rejection is thus respectfully requested.

In view of the foregoing, it is respectfully submitted that the application is in condition for allowance. Reexamination and reconsideration of the application, as amended, are requested.

If for any reason the Examiner finds the application other than in condition for allowance, the Examiner is requested to call the undersigned attorney at the Los Angeles, California telephone number (213) 337-6700 to discuss the steps necessary for placing the application in condition for allowance.

If there are any fees due in connection with the filing of this response, please charge the fees to our Deposit Account No. 50-1314.

Respectfully submitted,
HOGAN & HARTSON L.L.P.

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By: Lawrence J. McClure
Lawrence J. McClure
Registration No. 44,228
Attorney for Applicant(s)

500 South Grand Avenue, Suite 1900
Los Angeles, California 90071
Phone: 213-337-6700
Fax: 213-337-6701